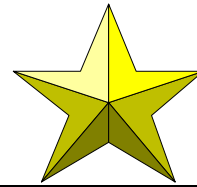

THE U.S. NAVAL OBSERVATORY

STAR



Volume 10, Number 2

6 August 2001



The Captain's Corner

***CAPT Ben Jaramillo,
Superintendent***

Another Washington summer is almost behind us and we are in the midst of planning for the next fiscal year. Where does the time go?

We have had a very rewarding and productive fiscal year mainly through the hard work and dedication of all of you at the Naval Observatory in Washington and Flagstaff. I personally want to thank all of you for your efforts in keeping the USNO in the forefront of what we do best.

I hope that all of you had the opportunity to take well-deserved vacations this summer. You are in a highly technical and scientific business and each of you deserves to take some time away from work and indulge your mind in other pleasures far from work.

I am looking forward to the upcoming fiscal year and all of the challenges it brings with it and I hope you are too. Together we will continue making this a fine institution and a fun place to work. I will see you around on the grounds – take care.

USNO Conference Room Dedicated to Former CNO ADM James Watkins

***Reprinted from Oceansp@ce online Newsletter,
20 July 2001***

ADM James D. Watkins was honored in a July 12, 2001 ceremony that recognized his visionary leadership and numerous contributions to operational naval oceanography, ocean research, and policy governing the wise usage of ocean resources. Hosted by the Oceanographer of the Navy RADM Richard

D. West, the ceremony highlighted the dedication of the "Admiral James D. Watkins Conference Room" at the historic U.S. Naval Observatory administration building here. The elegant Greek revival building, designed by renowned American architect Richard Morris Hunt and completed in 1893, today houses the staffs of both the Naval Observatory and the Oceanographer of the Navy. Also on the grounds sits the residence of the vice president of the United States. In preparation for the dedication, the conference room was refurbished to approximate the way it would have looked in the late 19th century.

Before a crowd of high-ranking naval officials, luminaries in the field of ocean science, and members of the Watkins family, the highlight of the ceremony was the unveiling of an oil painting by portrait artist Beverly Stautz depicting Watkins during his tenure as chief of naval operations. The portrait depicts the Admiral in the act of signing a policy letter on "Oceanography in the Navy."

This letter, signed on April 19th, 1984, articulated the importance of oceanography and related disciplines to the U.S. Navy's operational mission and mandated continued research and development "both for the Navy and the national oceanographic effort." Its principles continue to guide the naval oceanographic community today.

Watkins is also the winner of the Oceanology International Lifetime Achievement Award, conferred at OI Americas 2001 last April in Miami Beach, Florida.

Dignitaries at the ceremony included VADM Conrad C. Lautenbacher (ret.), current president of the

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Consortium for Oceanographic Research & Education (CORE); Dr. Rita Colwell, head of the National Science Foundation; VADM Paul Gaffney II, president of the National Defense University; and RADM Jay Cohen, chief of naval research.



***ADM and Mrs. James D. Watkins cut the ribbon
on the newly renovated Conference Room in
Building 1.***

Portrait of Matthew F. Maury Unveiled

On April 16, 2001, a new portrait of LT Matthew F. Maury, first Superintendent of the USNO, was unveiled in the USNO Library in Building 1. On hand for the ceremony were a number of invited guests, including LT Maury's great-grandson, former Superintendent CAPT Maury Werth, USN (ret), who headed the Observatory from 1968 to 1972. Below are the remarks of Dr. Steven J. Dick, USNO Historian, who presided over the ceremony.

The achievements of Matthew Fontaine Maury are far too numerous to recount here. His definitive biography runs to 700 pages, and that no doubt is the short version. He is the subject of one of the longest chapters in my forthcoming history of the Naval Observatory. Such lengths are fully justified. Maury was the first Superintendent of the Naval Observatory, and his tenure from 1844-1861 was the

longest of any Superintendent here. Maury was ambitious, and his tenure was characterized by a problem that managers everywhere will recognize: so much to do, and so few resources. Nevertheless, his accomplishments are legendary in astronomy, oceanography and meteorology. He was active at a time when American science was just coming into its own, and the Federal government beginning to recognize that science could be useful for practical pursuits. Maury's star catalogues, wind and current charts, and other products are well known. Rather than try to give an overview of his achievements I want to focus for just a few minutes on his fame in one area, his charting of the oceans, not only for winds and currents, but also for whales.

In this regard, recently one of our astronomers drew my attention to what must be the earliest literary allusion to the Naval Observatory, then also known as the National Observatory. It involves Maury, and it is found in no less a literary masterpiece than Herman Melville's *Moby Dick*, originally published under the title *The Whale* in 1851. The allusion is found in Chapter 44, "The Chart," and Melville is setting the stage for Captain Ahab's famous chase for Moby Dick:

"Had you followed Captain Ahab down into his cabin after the squall that took place on the night succeeding that wild ratification of his purpose with his crew, you would have seen him go to a locker in the transom, and bringing out a large wrinkled roll of yellowish sea charts, spread them before him on his screwed-down table. Then seating himself before it, you would have seen him intently study the various lines and shadings which there met his eye; and with slow but steady pencil trace additional courses over spaces that before were blank. At intervals, he would refer to piles of old log-books beside him, wherein were set down the seasons and places in which, on various former voyages of various ships, sperm whales had been captured or seen."

Melville goes on to say that "to anyone not fully acquainted with the ways of the leviathans, it might seem an absurdly hopeless task thus to seek out one solitary creature in the unhooped oceans of this planet. But not so did it seem to Ahab, who knew the sets of all tides and currents; and thereby calculating the driftings of the sperm whale's food; and, also calling to mind the regular, ascertained seasons for hunting him in particular latitudes; could arrive at

reasonable surmises, almost approaching to certainties, concerning the timeliest day to be upon this or that ground in search of his prey.” Thus, Melville points out, “attempts have been made to construct elaborate migratory charts of the sperm whale.”

In a footnote to these passages Melville says “Since the above was written, the statement is happily borne out by an official circular, issued by Lieutenant Maury, of the National Observatory, Washington, April 16th, 1851. By that circular, it appears that precisely such a chart is in the course of completion; and portions of it are presented in the circular.” Melville then quotes from Maury’s circular.

The interesting thing is how quickly the information had come to Melville; Maury’s circular was issued April 16th; Moby Dick (The Whale) was published in London on October 18th. So just 6 months after Maury’s circular was issued, his work was already immortalized in a literary masterpiece. And note today is the 150th anniversary of Maury’s circular.

By the way this would not be the last time the Naval Observatory was incorporated into literature and the arts. Science fiction fans will be interested to note that Robert Heinlein, in a 1940 story titled “Blowups Happen”, has his character Captain Thomas P. Harrington, Director of the USNO propounding a theory that the craters on the Moon were formed by lunar atomic experiments gone wrong! Since the Earth is about to undertake the same experiments in 1940, this theory takes on some urgency! Carl Sagan’s novel Contact has Ms. President coming up to look through the USNO’s telescope at Vega, where mysterious signals have originated. And in one of the old TV Superman episodes, Superman comes to the USNO to stop the Master Clock and thus avoid some time-sensitive catastrophe.

The Melville citation is only one small example of Maury’s influence on American science and culture. In addition to his astronomical work, he is considered the founder of oceanography. His most famous book Physical Geography of the Sea, was published in 1855. In 1853 Maury also organized the first International meteorological meeting in Brussels. And Maury was one of the founders of the American Association for the Advancement of Science (AAAS).

There are also many interesting stories about Maury’s family. Maury’s brother-in-law was Cdr. William L. Herndon, who worked at the Observatory in the 1840s and later achieved fame for his bravery when, under his command, the U. S. Mail steam packet Central America went down during a hurricane in 1857 with heavy loss of life and some \$450 million in gold coins from the California Gold Rush. The loss of the Central America was the 19th century equivalent of the Titanic. The wreckage was located in 1986 in 8000 feet of water 200 miles off the coast of South Carolina, and some of the recovered artifacts were auctioned at Sotheby’s in 2000. The town of Herndon, VA, where I happen to live, was named for Cdr. Herndon shortly after the ship’s loss. The loss of his brother-in-law weighed heavily on Maury, and for a while Herndon’s family lived at the Observatory with Maury.

I’ve only touched the tip of the iceberg in Maury’s career. But it is clear that it is entirely fitting that a new portrait of Matthew Fontaine Maury should now be unveiled at the U.S. Naval Observatory, which is also home to the Oceanographer of the Navy. And, we are very pleased to have with us two of the great grandsons of Maury, Capt. J. Maury Werth (Superintendent of the USNO 1968-70), and Mr. George Carter Werth. I now turn over the program to Capt. Ben Jaramillo, the current Superintendent.



The Maury portrait, unveiled by former Superintendent and Maury descendent CAPT J. Maury Werth (second from left) as current Superintendent CAPT Ben Jaramillo looks on.

SEAP Interns Observe the Sun

Over the past decade USNO has hosted a number of high school summer interns in partnership with SEAP, the George Washington University's Science and Engineering Apprentice Program. Each of the SEAP interns is partnered with an Observatory staff mentor, giving them the opportunity to work in the many diverse areas of the Observatory's mission.

This year, the interns are also gaining some direct observational experience using the Observatory's newest telescope, the 6-inch f/9 refractor in Building 25. Each day, at 11:00 am, weather permitting, three of the interns roll the roof back and point the telescope at the Sun to record sunspots. They first record the basic configuration of the sunspot groups by drawing the projected image of the Sun, then they count the numbers of spots in individual groups using direct observation through a visual solar filter. Their observations may be seen on a temporary internal web page, <http://www.usno.navy.mil/library/sunspot/sunspot.html>.



SEAP Interns Shawnette Adams (left) and Sabrina Snell (right) prepare to draw sunspots under the watchful eye of mentor Lara Schmidt (TS)

USNO In The News

USNO's preeminence in the field of star catalogs was highlighted in two separate articles in the July, 2001 issue of *Sky & Telescope*. The first, a "News Note" by Roger Sinnott, touts the work-in-progress UCAC as "The Best Star Catalog Ever". The second, an article in the "Astronomical Computing" section by Adrian Ashford, mentions several of the Observatory's catalogs that are currently available online or on CD-ROM.

One of the more unusual places that USNO's name has been spotted recently was in a recent issue of *Entertainment Weekly*. The PAO was asked to comment on the rather contrived astronomical premise to the summer movie *Laura Croft: Tomb Raider*...

Geoff Chester's web-cam solar, lunar, and planetary images were featured on the "Astronomy Picture of the Day" website on July 14.

The spectacular daylight fireball that streaked across the late afternoon skies on July 23 caused a deluge of inquiries to the USNO Public Affairs Office. Among the national broadcast and print media that contacted the Observatory for commentary on the event were CNN, MS-NBC, NBC News, ABC News, Fox News Channel, CBS Radio News, the Westwood One Radio Network, the Associated Press, Scripps-Howard News Service, USAToday, and the Washington Post News Service. Local coverage was also carried by WRC-TV (ch. 4), WTTG-TV (ch. 5), WJLA-TV (ch. 7), WUSA-TV (ch. 9), Radio stations WMAL, WTOP, WBAL (Baltimore), and WBZ (Boston). In addition, stories about the fireball appeared in *New York Newsday*, *The San Francisco Chronicle*, *The Philadelphia Enquirer*, as well as dozens of Internet news groups.

Security Notes

USNO POLICE EMERGENCY NUMBERS

34th Street Gate (24 Hours): 762-1468

Shift Lieutenant: 762-0336

Shift Sergeant: 762-0338

Local Emergency Number: Dial 99 + 911.

When calling the local emergency number please notify the USNO police in order to escort the emergency personnel and vehicles to the scene.

GATES (Hours of Operation):

34th Street Gate: Open 24 Hours/7 Days Per Week

South Gate: Open Monday through Friday, 0545 - 1830

Wisconsin Gate: Closed until further notice

Davis Street Gate: Closed

Gilliss Avenue Gate: Opened as Directed, otherwise closed

Wisconsin Turnstile: 24 Hours Daily (Must have USNO Proximity Card to re-enter).

When expecting visitors, please send an e-mail note to the **#Visitor Request** list on the USNO Outlook system, or FAX the request to 762-1553

ABSTRACTS OF RECENT PAPERS:

PRELIMINARY RESULTS FROM THE USNO ATOMIC FOUNTAIN DEVELOPMENT PROJECT

Thomas B. Swanson, Eric A. Burt, Christopher R. Ekstrom, U. S. Naval Observatory Washington, DC 20392, USA

Clock Development PTTI 2000

Atomic fountain clocks are emerging as an important new technology for the realization of extremely precise passive atomic standards. The U.S. Naval Observatory (USNO) has undertaken a project to develop atomic fountains for eventual incorporation into the USNO Master Clock.

We have recently demonstrated short-term stability of 2×10^{-13} at 1 second with white frequency behavior into the mid 10^{-15} s in our first cesium R&D device. We report on these results and hope to have frequency measurements relative to internal timescales at the USNO. We will also discuss plans for more heavily engineered operational devices and their incorporation into the USNO Master Clock.

DOUBLE STARS IN THE TYCHO-2 CATALOGUE

Brian D. Mason, Gary L. Wycoff, Sean E. Urban, William I. Hartkopf, Ellis R. Holdenried and Valeri V. Makarov

The Astronomical Journal, Vol. 120, Pg. 3244, December 2000

The Tycho-2 Catalogue (Hoeg et al. 2000a) provides astrometric and photometric information for 2.5 million stars. While within the Tycho-2 Catalogue there is no separate listing of double star parameters, there is a wealth of double star data. For all measured double star systems, each component has its own entry in Tycho-2 (this corresponds to the Hipparcos "double entry systems") and the classical double star parameters of separation, position angle and magnitude difference can be calculated for these systems. Most double stars within the Tycho-2 Catalogue are identified by a code indicating a double, failed double or photocentric solution. Stars flagged in this manner include 6,251 known double stars and 1,234 new double star systems [designated in the Washington Double Star (WDS) catalog with a "TDS" discovery code]. Also, 4,726 systems solved via Tycho-2 "single star treatment" not only matched one component of a WDS pair but also had a nearby star which closely approximated the position and magnitude of the other WDS component. Finally, 1,134 WDS systems were seen as single in Tycho-2 whose historical double star parameters would indicate Tycho-2 should have measured them. The observational statistics of these various classes of objects are presented together with catalog statistics for those with single star solutions. A quantitative assessment of Tycho-2 double star measures is provided via a comparison of Tycho-2 O-C residuals to known orbits. Finally, a subset of systems measured by Tycho-2 have been verified via speckle interferometry using the 82-inch telescope of

McDonald Observatory. These results are presented here also.

NONTIDAL OCEANIC CONTRIBUTIONS TO GRAVITATIONAL FIELD CHANGES: PREDICTIONS OF THE PARALLEL OCEAN CLIMATE MODEL

Thomas J. Johnson

**Earth Orientation Department, U.S. Naval
Observatory, Washington, D.C.**

Clark R. Wilson

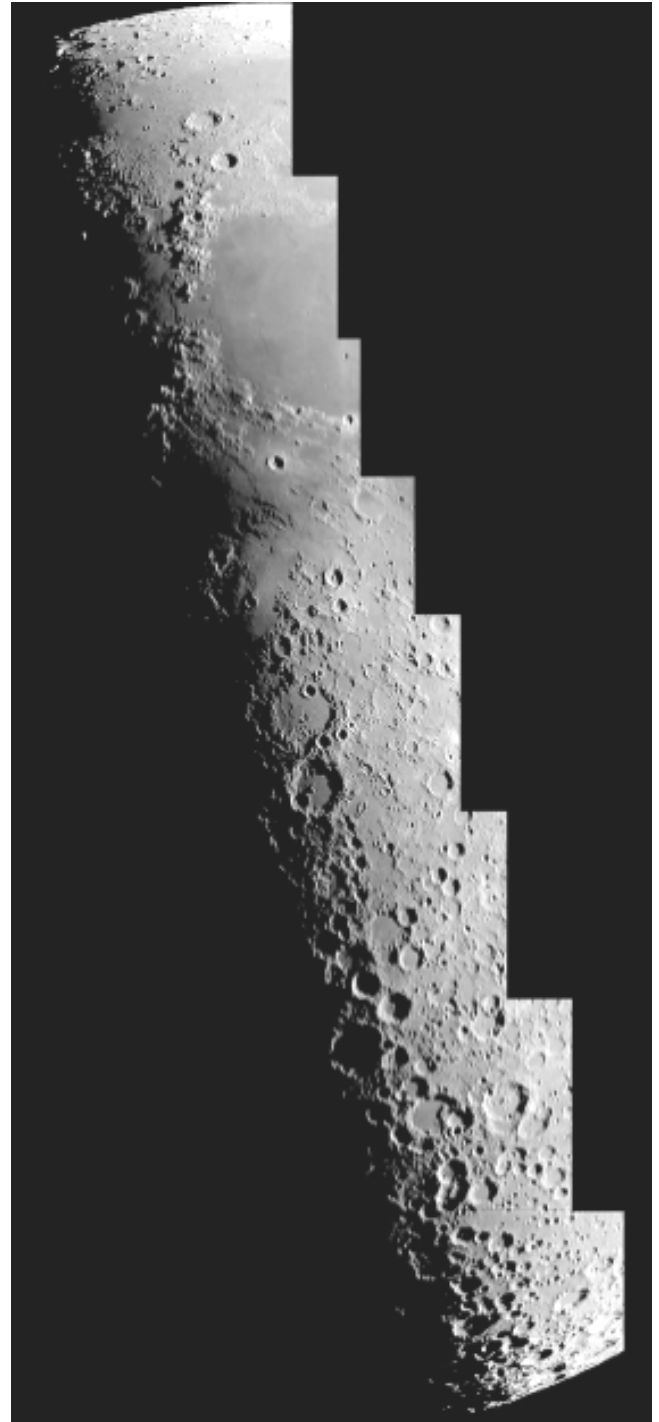
**Center For Space Research, Department of
Geological Sciences, and Institute
for Geophysics at the University of Texas at
Austin, Texas**

Benjamin F. Chao

**Space Geodesy Branch, NASA Goddard Space
Flight Center, Greenbelt, Maryland**

*Journal of Geophysical Research, Solid-Earth, Vol. 106, No.
B6, 11, 315-11, 334, June 10, 2001*

This study examines the nontidal contributions of the oceans to the Earth's gravitational field variations as predicted by a global ocean general circulation model: the Parallel Ocean Climate Model. Such variations in the gravitational field Stokes coefficient are determined up to spherical harmonic degree and order 20 and compared with satellite laser ranging (SLR) data from LAGEOS I and LAGEOS II. For most Stokes coefficients except the lowest-degree ones, this investigation indicates that the application of sea level adjustment to reduce the effects of the model's lack of mass conservation due to the Boussinesq approximation has a negligible effect on timescales less than a few years. Predicted gravitational changes show strong seasonal variability and account for a portion of the variations estimated from SLR. We conclude that, in addition to the atmosphere, the oceans are an important contributor to the temporal variations in the Earth's gravitational field. The Stokes coefficients are useful in examining oceanic mass transport between hemispheres and ocean basins. The estimated oceanic power spectrum has a spectral shape similar to the atmosphere and is well above the noise level of planned satellite missions like the Gravity Recovery and Climate Experiment (GRACE).



***The Moon
Imaged May 30, 2001
20-cm SCT, f/10 Cassegrain focus
Composite of 8 frames, each comprised of
30 images captured with a Philips Vesta
675K web cam, stacked and processed with
a Gaussian unsharp mask***

USNO
H*A*P*P*E*N*I*N*G*S
Spring Open House



***Asaph Hall, prowling the grounds with
Phobos & Deimos***



***One of the helicopters from the fleet maintained for
the President and Vice-President proved to be a big
hit with the visitors***



Albert Einstein pedals his way around the Observatory.



***Galileo re-creates his Tower of Pisa
experiment from the 12-inch
catwalk***

USNO H*A*P*P*E*N*I*N*G*S 2001 Summer Picnic



Good food, family fun, and perfect weather!



IT's Jan Robertson shows good pitching form in the "Dunk the Deputy" contest. Give that fan a contract!

The annual USNO Command Picnic was held on the occasion of the Summer Solstice. While some folks were chasing eclipse shadows in Africa, the staff and their families enjoyed a great afternoon of contests, mini-golf, a moonbounce, clowns, piñatas, and door prizes.

The picnic also celebrated the retirement of USNO's Command Master Chief, **QMC(SW) Pat McCarthy**. We all wish Pat "Fair winds & following seas"!



QMC(SW) Pat McCarthy receives his Shadow Box from Superintendent CAPT Ben Jaramillo.



The champion AD volleyball team takes on EO.

The U.S. Naval Observatory *Star*

U.S. Naval Observatory, Washington, D.C.

Superintendent

Captain Ben Jaramillo

Deputy Superintendent

Commander Doug Groters

Scientific Director

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Editor

Geoff Chester

The Naval Observatory *Star* is published quarterly by the Public Affairs Office.

Deadline for next issue: 1 October 2001

Information and opinions contained in the U.S. Naval Observatory *Star* do not necessarily reflect the views of the Department of Defense, the Department of the Navy, or the Chief of Naval Operations. The facts as presented in each article are verified insofar as possible, but any opinions are strictly those of the individual authors. Mention of any products or companies does not constitute an official endorsement by the DoD or the Navy.

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